Remarks

The amendments to the specification correct minor errors. No new matter is believed to be added to the application by this amendment.

Status of the Claims

Claims 1-14 are pending in the application. Claims 7-10 and 14 have been withdrawn from consideration by the Examiner. The amendments to claim 1 find support in claim 5 and in the specification at page 20, lines 14-15, and at page 24, lines 11-13.

Rejection under 35 U.S.C. § 103(a) over Honda

Claims 1-6 and 11-13 are rejected under 35 U.S.C. § 103(a) as being obvious over Honda (U.S. Patent No. 5,851,700). Applicants traverse.

The Present Invention and its Advantages

The present invention pertains to a light-scattering sheet that has a light-scattering layer composed of resins that vary in refractive index and isotropically scatters light. The light-scattering layer has a ratio of linearly transmitted light to incident light

An important aspect of the invention lies in that the light scattering layer has a

regular phase separation structure having at least a bicontinuous phase

structure formed by spiodinal decomposition.

Distinctions of the Invention over Honda

Honda pertains to a filter for a liquid crystal display device having a

diffusing plate. Claim 1 of Honda sets forth:

> A method for widening a view angle of a liquid crystal display
> device comprising fitting a filter to a liquid crystal display device,
> wherein said filter comprises a light diffusing plate which is
> obtained by shaping into a film a composition comprising at least
> two photopolymerizable oligomers or monomers having refractive
> indexes which differ by at least 0.01 and irradiating ultraviolet
> light on said film of the composition, wherein the polymerizable
> oligomers or monomers have acrylate functional groups (claim 1).

Honda discusses resin components varying in refractive index for the

light diffusing plate. Honda describes

> A specific example of a combination of the photopolymerizable
> monomers or oligomers is the combination of at least one
> component selected from the group consisting of monomers (such
> as 2, 4, 6-tribromophenyl acrylate, tribromophenoxyethyl acrylate,
> nonylphenoxyethyl acrylate, 2-hydroxy-3-phenoxypropyl acrylate,
> phenylcarbitol acrylate, phenoxyethyl acrylate, etc.) and oligomers
> such as ethylene oxide-modified bisphenol-A diepoxy acrylate, etc.,
> and at least one component selected from the group consisting of
> monomers such as triethylene glycol diacrylate, polyethylene glycol
> diacrylate, neopentyl glycol diacrylate, 1,6-hexanediol diacrylate.

Example 1 of Honda states

was obtained by the reaction of polypropylene glycol, hexamethylene diisocyanate and 2-hydroxyethyl acrylate, 2, 4, 6-tribromophenyl acrylate (a refractive index of 1.576) (30 parts), 2-hydroxy-3-phenoxypropyl acrylate (a refractive index of 1.526 (30 parts), and 2-hydroxy-2-methylpropiophenone (1.5 parts) as a photopolymerization initiator were added and mixed to prepare a photopolymerizable composition. (Honda at column 6, lines 6-15).

Regarding the structure of the light diffused-plate (which is fundamentally different from that of the invention), Honda recites

The filter comprising the light diffusing plate...is produced by utilizing a property of the composition comprising the specific photopolymerizable monomers or oligomers that they are photopolymerized and cured while causing a phase separation by the irradiation of the UV light. This method can produce the filter comprising a refractive index modulating type smooth light diffusing plate having a domain gap of 1 to 20 μm, without the use of a mask during the UV light irradiation. Since the separated phases have a continuous interface between them, no light is reflected at the interface when light passes through the obtained filter, so that the light transmission is not decreased. Since this filter does not have a structure with regularity unlike the phase lattice, it does not form any Moiré fringe. (Honda at column 4, lines 47-60).

In respect to the light-scattering property of the light diffused-plate, Honda states

A selective diffusing property of the light diffusing plate in relation to the incident angle of light is defined by a haze of the plate in relation to the incident angle of light. Preferably, the light diffusing plate...has a property of changing the haze depending on the incident angle of light, and both a light incident angle range with a light diffusing ability of a haze of at least 30 .....

42.

Furthermore, "When the filter comprising the light diffusing plate...is fitted to the light emitting side of the liquid crystal display device, it is preferably assembled in a laminate by inserting it between the outer surface of the device and a transparent substrate." (Honda at column 4, line 66 to column 5, line 3).

However, Honda fails to teach or suggest (i) a regularity of a phase separation structure, (ii) a bicontinuous phase structure, and (iii) spinodal decomposition. Concretely, the light diffusing plate of Honda has a specific domain gap, and the separated phases have a continuous interface between them.

The plate of Honda has no bicontinuous phase structure. Further, since the plate of Honda is produced by photopolymerizing and curing the specific photopolymerizable monomers or oligomers with UV light, Honda fails to disclose or suggest spinodal decomposition. The plate of Honda does not have a regular structure. As a result, a person having ordinary skill in the art would not be motivated by the teachings of Honda to produce a claimed embodiment of the invention. Thus, Honda fails to allege *prima facie* obviousness over the invention.

That is, the light diffusing plate of Honda has an irregular structure so

distribution. This can be readily ascertained by observing the distribution curve 15 in Figure 6 of Honda. Namely, the distribution curve 15 depicts the intensity distribution of diffused light at an incident angle of 0°, and the angle of distribution of the diffused light intensity is a Gaussian distribution having a half width of about 8°. In contrast, the intensity distribution of diffused light at an angle of incidence of 0° corresponds to the light diffusing intensity of the invention. See page 26, lines 16-20 of the specification. Also, although the light-scattering property of the present invention is measured by reflective light and the light-scattering property of Honda is measured by transmitted light, the reflective light is comparable with the transmitted light in regards to the light-scattering property since the properties of the reflective light includes that of transmitted light.

Accordingly, the plate of Honda corresponds to comparative Example 1 shown in Figure 4 of the application. As is apparent from Table 2 at page 50 of the specification, in the sheet of comparative Example 1, the angle range having 80% or more intensity to a maximum intensity of diffused light lies about 7.0°. As a result, according to Honda, uniform brightness of the display surface could not be effectively improved as the viewing angle changes.

brightness can be realized. Further, in respect to the light scattering intensity

scattering center appears. This is demonstrated from the results of Examples 1, 2, and 11. That is, the light-scattering sheets of Examples 1, 2, and 11 provide a uniform light-scattering intensity area that appears over a wide angle range (10.0° or more) such that the display surface can be illuminated uniformly even when the viewing angle changes. Thus, the invention clearly demonstrates unexpected results over the technology of Honda.

As has been shown, the single reference of Honda fails to disclose or suggest all the claimed elements of the invention. Thus, a *prima facie* case of obviousness has not been made over Honda. Further, even if obviousness over Honda can be alleged, the invention shows unexpected results demonstrating clear superiority over Honda.

Accordingly, this rejection is overcome and withdrawal thereof is respectfully requested.

References cited but not utilized by the Examiner

The references but not utilized by the Examiner shows the status of the conventional art that the invention supercedes. Accordingly, no further remarks are necessary.

Applicants thank the Examiner for considering the Information

1449 Form of record in the application in the Office Action mailed January 15, 2003.
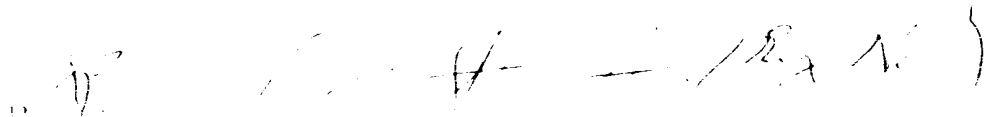
Conclusion

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Robert E. Goozner, Ph.D. (Reg. No.42,593) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

Attached hereto is a marked-up version of the changes made to the application by this Amendment.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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VERSION WITH MARKINGS SHOWING CHANGES MADE

In the Specification

The paragraph beginning on page 10, line 18, has been amended as follows:

Fig. 1 is a schematic side-view showing an instrument for measuring [a] linear[ly] transmittance.

The paragraph beginning on page 22, line 13, and continuing to page 23, has been amended as follows:

Incidentally, linear[ly] transmittance can be measured with a scattering-measuring instrument shown in Fig. 1 (manufactured by Chuo Seiki, Co., Ltd.). This measuring instrument comprises a light source unit 1 capable of oscillating non-polarized laser of wavelength of 543 nm, a sample stand 2 capable of putting a sample (light-scattering sheet) 3 thereon, a light-receiving unit 4 capable of receiving a laser beam from the light source unit 1 and composed of a photodiode. Incidentally, the sample stand 2 is capable of revolving. Further the light

revolution of an arm 5. Therefore, by putting the light receiving unit 4 on backside of the sample

scattering sheet 3 on the sample stand 2 can be detected by the photodiode. Moreover, by putting the light-receiving unit 4 between the light source unit 1 and the sample stand 2, the light-receiving unit 4 confronts the sample stand 2, and a reflected light from the light-scattering sheet 3 can be also detected by the photodiode.

The paragraph beginning on page 23, line 8, has been rewritten as follows:

In such a device, the intensity of transmitted light A is determined by putting the light-receiving unit on the backside of the sample stand, disposing a slit having diameter of 5 mm and 35 % of ND filter on the front of the light-receiving unit, radiating a laser in a direction normal to the light-scattering sheet on the sample stand, and light-receiving a transmitted light in the light-receiving unit disposed on a light path of a laser beam. Incidentally, the diameter of laser beam is 0.1 mm, and the distance between the light-scattering sheet as a sample and the light-receiving unit is 30 cm. Then, the light-scattering sheet is taken off from the sample stand, and a transmitted light B is determined in similar manner mentioned above. In consideration of the transmitted light decreased to a rate of the

Linear[ly] transmittance [=] (1 - 0.9216) X (A - B)

In the Claims

The claims have been amended as follows:

1.   (Amended) A light-scattering sheet comprising a light-scattering layer which comprises a plurality of resins varying in refractive index and scatters an incident light isotropically, wherein the light-scattering layer has a ratio of a linearly transmitted light to an incident light of 0.1 to 15% and has a phase separation structure having an average interphase distance of 3 to 15 μm,

wherein the light-scattering layer has a regular phase separation structure having at least a bicontinuous phase structure formed by spinodal decomposition.

5.   (Amended) A light-scattering sheet according to Claim 1, wherein the light-scattering layer **[has a phase separation structure composed of a plurality of resins varying in refractive index, and]** has a bicontinuous phase structure formed by spinodal decomposition or an intermediate